Distinguished Lecture Series

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Block Copolymers and Conventional Lithography

In the photolithographic process, information encoded in the aerial image of the exposure tool is transferred to the photoresist through a series of processing steps that culminate in the creation of patterned three-dimensional features. As feature dimensions shrink below 30 to 50 nm, however, the transferred information may not retain control over the size and shape of the patterned features (e.g. critical dimension control and line edge roughness). We are investigating the integration of self-assembling block copolymers into the lithographic process such that the materials themselves contribute valuable information towards the desired ends. At the same time we aim to retain essential process attributes such as pattern perfection, registration and the ability to pattern non-regular device-oriented structures.

Our approach is to lithographically define chemically patterned surfaces to direct the assembly of overlying films of block copolymers and block copolymer homopolymer blends. We demonstrate that through tailored interfacial interactions, it is possible to pattern sub 25 nm features with precise (sub 1 nm) control over their dimensions and shapes. We show that through this approach, almost the entire set of essential features required for integrated circuit fabrication can be created. We also have optimized the directed assembly of block copolymers such that the processing time is similar to a post exposure bake (~1-2 minutes), shown that it is possible to assemble features with very high aspect ratios (>5), and delineated design parameters for the materials with respect to pattern transfer properties.

Thursday, June 21, 2007
11 AM, Building 224, Room B-245

http://polymers.nist.gov/distinguished
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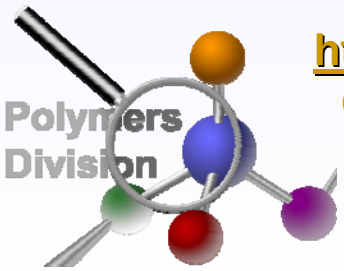

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